Blockchain's Role in Digital Transformation:

A Perspective for the

Intermediaries & Reinsurance Underwriters Association

May 16, 2018

77% of CEOs rank technological advances as the **most disruptive** megatrend impacting their business

- *PwC*

Source: PwC's 19th Annual Global CEO Survey (2016)

Companies will spend **$3.5 trillion** on Emerging Technology in 2017*

*Source: Gartner

bitcoin

What is bitcoin?

An unregulated digital virtual currency based on blockchain technology. It is used to process P2P transactions and offers lower transaction fees than traditional online payment mechanisms

BLOCKCHAIN

What is blockchain?

A decentralized public ledger of all transactions, essentially blocks of validated and cryptographic transactions chained together by mathematical algorithms

bitcoin

A crypto-currency is merely one application of crypto-technology, allowing the transfer of value via transactions recorded on a Blockchain.

There are many existing crypto-currencies, most notably Bitcoin.

Specific to crypto-currencies a key benefit include preventing double spending.

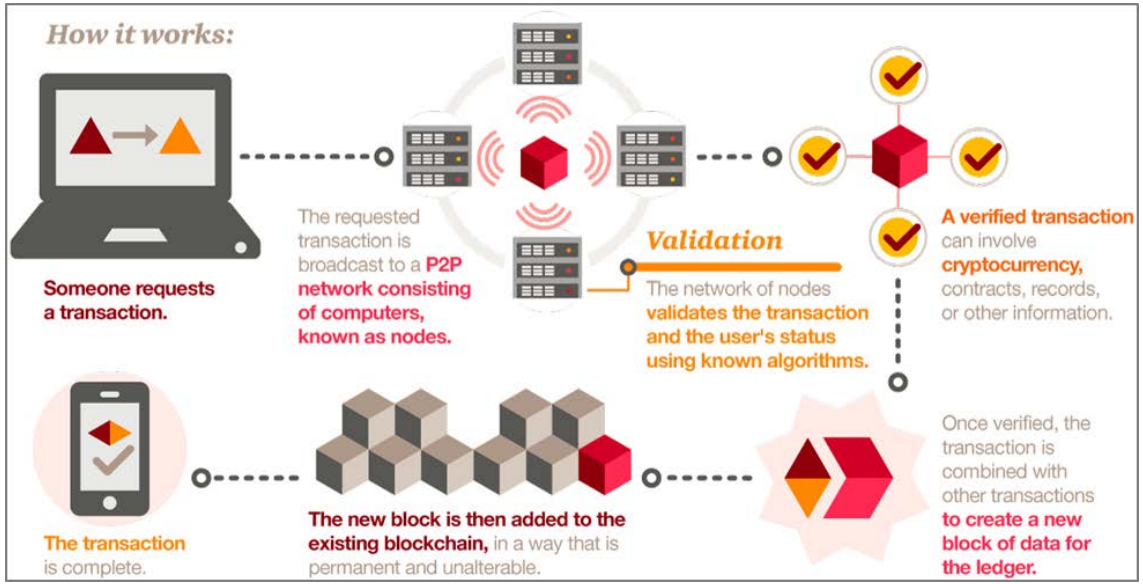
BLOCKCHAIN

Blockchain, does not require crypto-currency.

The platform can be constructed to handle a varying set of rules and configurations.

Related technology, such as smart contracts, can greatly improve process efficiency, transparency, reliability and reduce risk.

Here's how blockchain works…



…and the key technical concepts that come together to make it work and different from existing solutions

Distributed ledger

Every participant in the network has simultaneous access to a view of the information

Cryptography

Integrity and security of the information on the blockchain are ensured with cryptographic functions

Consensus

Verification is achieved by participants confirming changes with one another, replacing the need for a third party to authorise transactions

Smart contracts

The ability to run additional business logic means that agreement on the expected behaviour of financial instruments can be embedded in the blockchain

Blockchain enables these business benefits in a shared ecosystem…

Reduction of costs & complexity

Shared trusted transactions

Reduction of fraud

Audit trail & transparency

Security & Immutability

Resilience

…and here are the characteristics where blockchain makes sense

Multiple parties share data
multiple participants need views of common information

Intermediaries add complexity
removal of intermediaries can reduce cost and complexity

Multiple parties update data
multiple participants take actions that need to be recorded and change the data

Time sensitive interactions
reducing delay has business benefits

Requirement for verification
participants need to trust that the actions that are recorded are valid

Transactions interact
transactions created by different participants depend on each other

...and here are a few other examples of the different categories in which blockchains can add value

Supply Chain and Logistics

Tracking goods along their route to accurately estimate arrival time and collect data

Finance Effectiveness

Accelerate payments and settlement through real time purchase order updates and automating settlement

Loyalty Programs

Treating loyalty points as a cryptocurrency increases utility and value of loyalty programs

Asset Condition

Tracking part changes and service events throughout lifecycle of useful life (i.e. Asset “Health Record”)

Digital Identity Management

Authenticating identity on a blockchain for accelerated log in and increased data security

Digital Currencies

Decentralized currency crosses borders and eliminates intermediaries

Records Management

Blockchains provide an engine for collecting and maintaining verifiable records

Audit and Compliance

Enable real time transaction level assurance and provide additional transparency to stakeholders

One of the key considerations for enterprises looking to embrace blockchain technology is related to Public vs. Private blockchain

Public and private blockchains are both decentralized peer-to-peer networks, where each participant maintains a replica of a shared append-only ledger of digitally signed transactions. Public and private ledgers both use consensus protocol to provide guarantees on the immutability of the ledger

	Description	Examples
Public	• Completely open and anyone can join and participate in the network by purchasing or mining a token • Utilizes an incentivizing mechanism to encourage more participants to join the network (i.e. mining to obtain Cryptocurrencies) • Substantial amount of computational power necessary to maintain a distributed ledger at a large scale • To achieve consensus, each node in a network must solve a complex, resource-intensive cryptographic problem to ensure all are in sync • Little to no privacy for transactions	• Bitcoin, Ethereum and most Cryptocurrency/ Crypto Asset distributed ledgers
Consortia/ Private	• Network places restrictions on who is allowed to participate in the network, and only in certain transactions • Once an entity has joined the network, it will play a role in maintaining the blockchain in a decentralized manner • Only the entities participating in a particular transaction will have knowledge and access to it • Permissioned blockchains permit greater scalability in terms of transactional throughput	• Quorum (Private Ethereum Offshoot), Hyperledger, R3's Corda, Ripple

Blockchain enabled transformation poses ecosystem challenges

Adoption

- **Proper Incentives:** Potential participants will need to be sold on the value of the platform
- **Consensus Needed:** Participants must come to group agreement on platform and standards acceptable to all

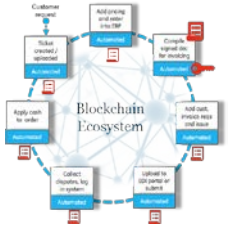
Participant Trust

- **Safety:** Re-assuring participants that their transactions are secure
- **Public vs. Private:** What are key differences and criteria for private and public blockchains?
- **Information Accessibility:** Are participants willing to expose more information to participate in a network

Legal & Regulatory Framework

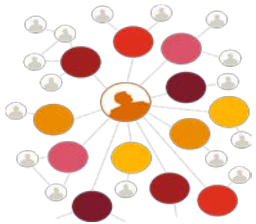
- **Regulatory Body:** Currently there is no global regulatory body to set standards on blockchain transactions
- **Real-Time Auditing:** Changes nature of audit from forensic analysis to real-time transaction monitoring that has yet to be tested or standardized

...and technology challenges



Blockchain Maturity

- **Young Technology:** May not operate at scale without compromising on security, speed or cost
- **Cost:** Hard to convince low budget customers



Interoperability/ Integration

- **Interoperability:** Ability to integrate with participant existing client systems and processes
- **Architectural Role:** How will blockchain eliminate, replace, or work with current technological platforms

...and companies will have to make critical decisions around the commercial model that they will employ

Option	Description	Analogue	Factors: Level of Investment	Factors: Ability to Drive Value	Factors: Ownership & Governance	Considerations
1 Sponsor Led	Leading sponsor of Blockchain infrastructure and standards	Walmart, MAERSK LINE	+++	++	+++	• Costs, benefits, and buildout considerations are borne by owner and services are charged to other participants in the network • Owner determines standards to which shared ecosystem participants would have to adhere • Owner can publicly declare market leadership and license the software to other market participants • Requires large players who can effectively "make the market"
2 Co-Ownership	Co-owner of Blockchain infrastructure and standards	? ? ?	++	++	++	• Costs, benefits, and buildout and standards are jointly borne by co-owners with services charged to other participants • Co-owners can publicly declare market leadership/ innovation • Co-owners could create a new entity to license the software and share in IP ownership and revenues
3 Utility/ Consortium Driver	Founding or joining member of an industry consortium or utility	B3i, r3, DTCC (Securing Today. Shaping Tomorrow.)	+	+	+	• Principle funding and control considerations including IP ownership • Ongoing commercial impact of utility services where cost/benefit is mutualized • Expanding the base to develop commercial success
4 Regulatory Follower	Leverage regulatory drive towards Blockchain infrastructure and standards	Great Seal of the State of Delaware	+	+	+	• "Wait and see" approach could alleviate competitive advantage • May slow down innovation mindset • Could be more cost-effective as investments may be limited prior to regulatory guidelines

PwC's Digital Services

High Impact / Low Impact / Limited Impact — High Investment / Low Investment

Blockchain in Insurance

Claims Management
Proof of Concept

Facilitated a two day workshop with Insurance industry stakeholders including:

- Brokers
- Claims Experts
- Insurers
- Third Party Administrators

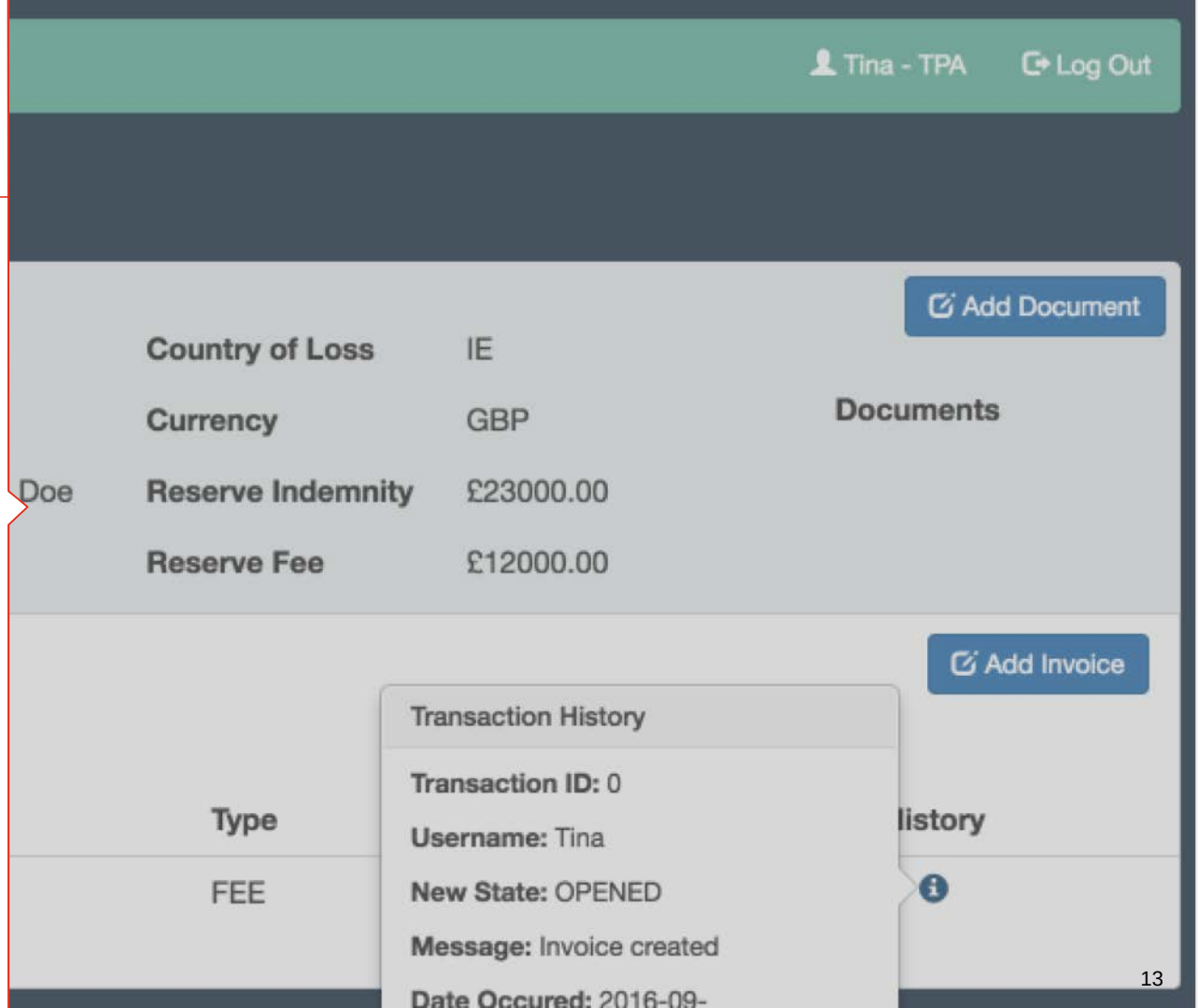
Collaboratively identified a number of painful processes.

We focused on the slow and error prone nature of claims creation and management.

Duration: 6 weeks

Technology: Eris

Demo & Video Available



Outcome of Claims Management engagement

Bordereaux Replacement

Successfully demonstrated the concept of placing a '**claim on chain**' in **6 weeks**

Constant Feedback

Delivery approach based on **continual demonstration and feedback** to stakeholders on a bi-weekly basis

Market Appeal

Demonstrated to **industry players** within the **London Market**

Collaborative Workshop

Worked directly with stakeholders within the insurance space, using workshops to **identify the problem** and **ideate over the solution**

Simplifying Claims

Beginning to take a convoluted area like claims and **simplifying the process** using Blockchain's key features, primarily transparency

Rapid Turnaround

From **conception, ideation and use case development** to working software within 6 weeks

Policy Placement
Proof of Concept

Completed insurance industry study in collaboration with Z/Yen

To understand the wholesale insurance market and develop suitable use cases.

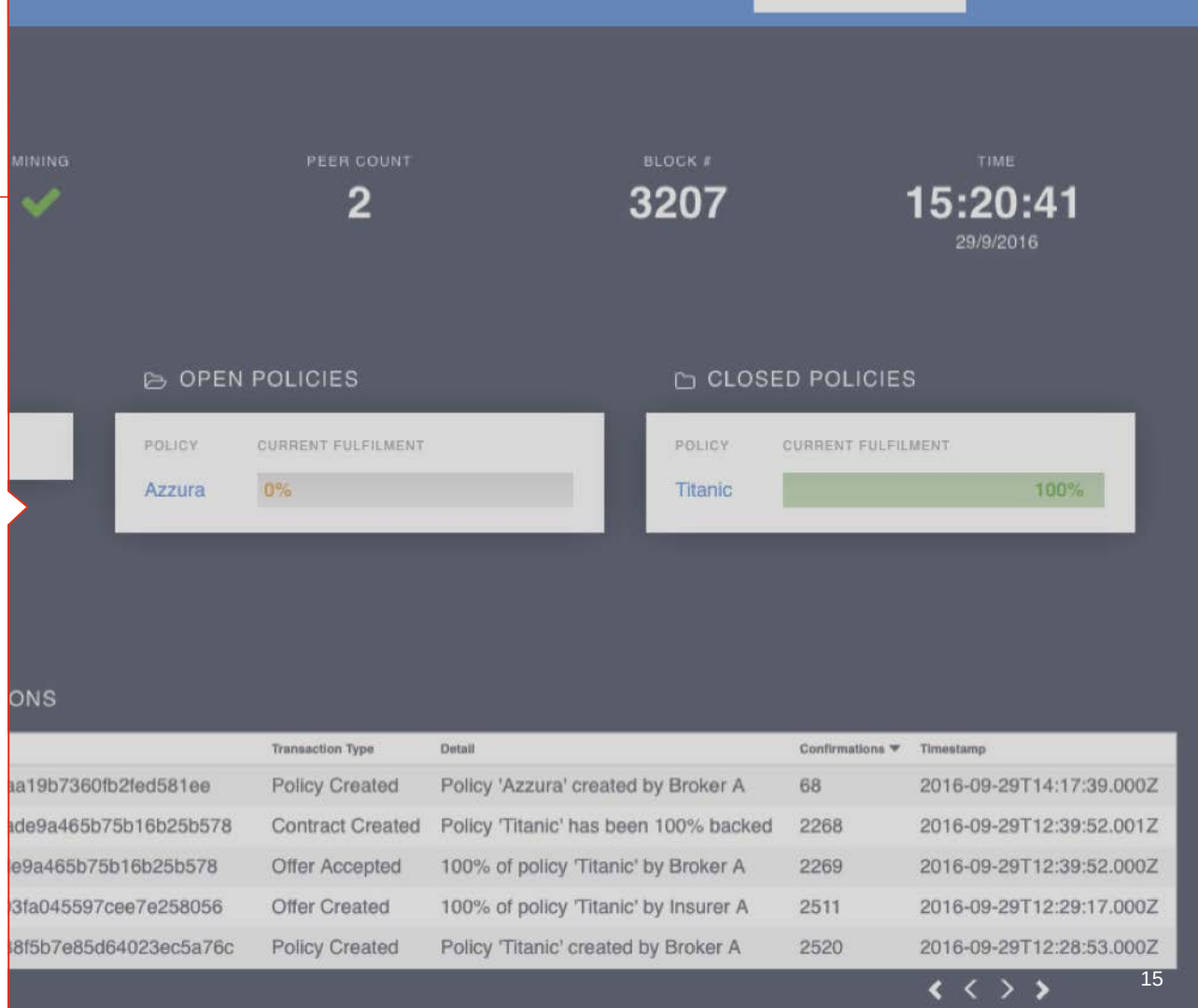
The study is available online.

Duration: 6 weeks

Technology: Multichain

Demonstrates how to put policy placement on the blockchain.

Demo & Video Available



Outcome of Policy Placement engagement

Policy Placement

Successfully created the concept of creating and sharing a policy on the blockchain in **6 weeks**

Minimal Viable Product

Product delivery using an **agile** approach, **iteratively delivering** MVP on a bi-weekly basis

Software

Demonstrated working software as opposed to theory and slideware

Delivery

An opportunity to showcase our team's **product delivery** capability in addition to our **blockchain specialty**

Awareness

Demonstrated to various **insurance industry stakeholders**

Collaboration

A **proposed consortia** involving major insurers to be established to look into **further opportunities**

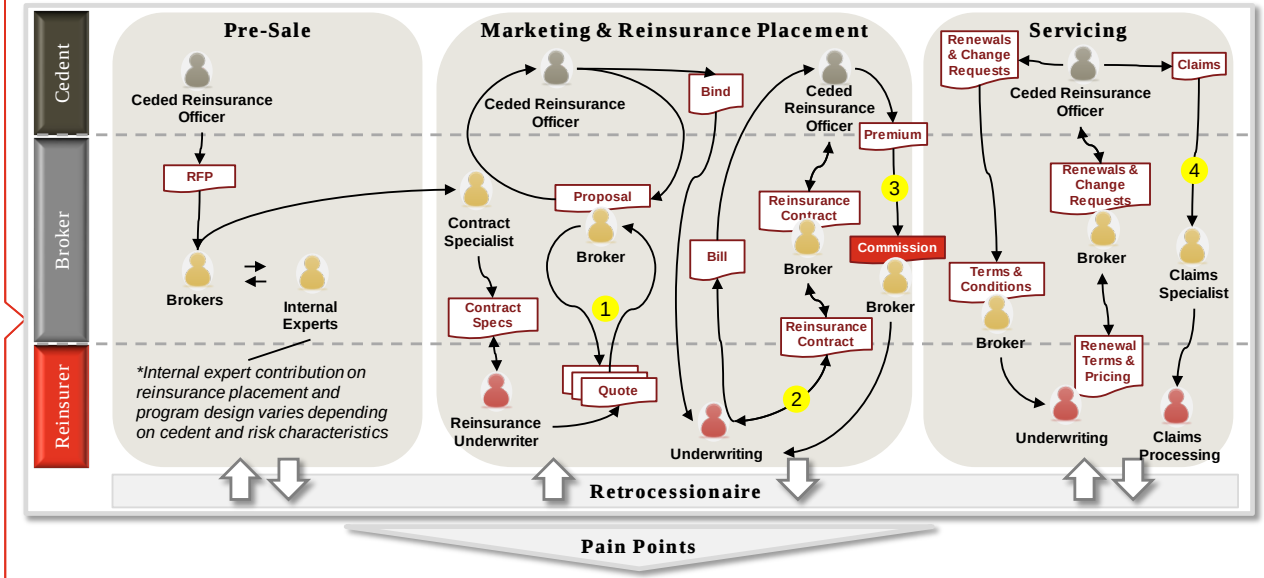
Ceded Reinsurance
Possible Proof of Concept

The reinsurance process across cedants/brokers/reinsurers/ retrocessionaires is fraught with inefficiencies across the value chain

"**The reinsurer that helps me take out 20 or 30% of my back office costs is going to get my business**" – Chief Reinsurance Officer Global Insurer

This quote is from a recent conversation with a senior insurance executive (his preceding comments pertained to reinsurer-based offers of analytical & risk advice, which he neither needed nor wanted, in contrast to cost relief, which was at the top of his agenda)

In this sense, blockchain-generated cost reductions can be viewed as **not only operational** (or within a specific firm) in nature, **but strategic as blockchain could enable** reinsurers and brokers to help their insurance clients realize significant ceded re cost savings



Pain Points

1 Workflow	2 Contract iteration & Data Security	3 Premium & Commission Tracking	4 Claim Tracking between Cedent & Reinsurer

1. No effective solution to connect major tasks, control workflow, and facilitate documentation and money flow
2. Numerous iterations between all parties to finalize reinsurance contracts while maintaining data security
3. Premium tracking and commission payouts between cedents, brokers, reinsurers, retrocessionaires are not standardized/difficult to reconcile
4. Claims tracking and payments between cedents, brokers, reinsurers, retrocessionaires are not standardized or effectively automated

How do we get started?

Blockchain Implementation Framework – Key Considerations

How does Blockchain align with the strategic direction of our organization?

- Use case(s) identification (e.g., design think, etc.)
- Business case development (SWOT, economic model, risk assessment, etc.)
- Competitive landscape assessment
- Owner/operation (commercial) model (e.g., sole vs. co-ownership, utility/consortium, etc.)
- IP protection
- Ecosystem partnerships
- Alignment with broader organizational strategy, incl. technology vision and roadmap (e.g., early adopter vs. fast-follower approach, overall cloud strategy, etc.)
- PR strategy

PwC's Blockchain Implementation Framework

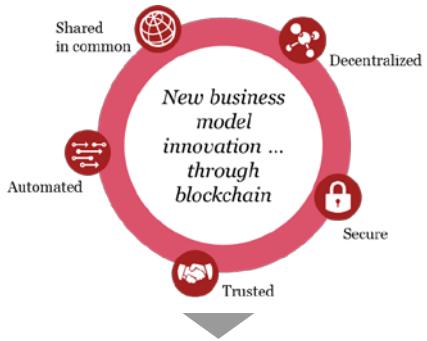
What should we consider from a technical standpoint?

- Infrastructure choice & scalability
- Distributed ledger fabric
- Consensus and validation models
- Data hosting security requirements
- Data transport
- Hardware
- System integration
- Deployment
- UX/UI Design
- Testing approach

How do we operationalize our approach?

- Implementation plan and roadmap (e.g., MVP, PoC, iterative sprints, etc.)
- Governance model and Leadership support
- Communications framework (external and internal)
- Metrics (i.e., KPIs) definition, tracking, and reporting
- Product development oversight and reporting
- Scaling considerations (i.e., depth vs. reach, etc.)
- Change management / HR

Once one or more use cases have been chosen, the blockchain journey generally follows the path below



Identify opportunity areas

- Define goals and success factors
- Confirm use case(s) for proof of concept (POC)
- Determine which product/customer segment offers the highest value to support POC validation

Identify potential channel partners

- Engage selected channel partners for partnership and innovation piloting
- Evaluate platforms / blockchain technology vendors to the vision, capabilities and requirements
- Confirm blockchain vendor partnership arrangements

Execute proof of concept

- Conduct technology experimentation in sandbox environment (iterative)
- Coordinate with selected channel partners on specific data sets required for simulation
- Confirm channel partner arrangements

Conduct pilot

- Configure/build logic and rules based on use case(s)
- Initiate mock-simulations
- Make adjustments to configuration and logic and refine data sets as necessary (iterative)

Gather pilot metrics

- Gather transaction metrics
- Assess key learnings
- Confirm business case for expansion

Plan

Establish action plan and finalize business case for moving forward on blockchain expansion, adoption, and implementation

Production launch

Implement plan and track performance

Why a Proof of Concept (PoC)?

PwC's agile methodology allows our clients to make a small initial investment to collaboratively experiment, learn, and pivot quickly in a contained environment to produce a Minimum Viable Product (MVP) based on desired business outcomes

Business problem over processes and tools

Start with the business issue and select tools based on "What problem are we trying to solve?" rather than begin with solution looking for a problem

Working prototypes over excessive documentation

Adopt agile delivery methodology that's light on documentation to accelerate the creation of an actual working product that enables real-user interaction

Respond to change rather than follow a rigid plan

Adopt a "fail fast" mentality that allows us rapidly achieve desired outcomes

Customer collaboration over rigid contracts

Take "outside-in" perspective where customer-user experience / workflow simplification drives product development

Proof of Concept

Build proof of concept to verify the feasibility of solution

Technical Design

- Determine architecture to be used including choice of blockchain platform
- Agree approach for front end technologies

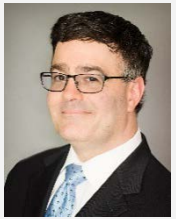
Build

- Iterative build approach with regular demos to validate completed features
- Cloud based infrastructure
- Validation of key technical deliverables e.g. tamper-proof data

Test

- Functional validation of platform
- User/business acceptance of features
- Limited non-functional testing of security, performance and resilience

Validating the business impact of selected use case is equally as important as proving out the technical feasibility



Joe Calandro

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Areas of expertise

- Joe specializes in helping insurers develop & enhance their underwriting, analytical, M&A, risk management, & performance management capabilities
- Solutions that Joe has developed/co-developed include: economic insurance performance measurement (including P&C cost of equity & business unit hurdle rate analyses), liability portfolio analyses and accumulations mgmt., commercial Underwriting Capability Maturity Model, claims reserve variance and controls, and strategic risk mgmt. and emerging threat controls

- Joe Calandro is a Managing Director in ***PwC's Insurance Advisory*** practice with over 25 years of broad industry, consulting, teaching, & research experience in the United States & internationally focusing on strategy/M&A/analytics, underwriting, performance/risk management

- Joe is also a Fellow of the ***Gabelli Center for Global Security Analysis*** at ***Fordham University***, a contributing editor of ***Strategy & Leadership***, & a member of the non-profit ***Progress Through Business***

- Prior to joining ***PwC***, Joe led the Enterprise Risk Management function of ***ACE Group Holdings*** (now Chubb) where his responsibilities included a variety of analytical, credit, underwriting, & correlation-related activities regarding management of the firm's assets & liabilities. He was also a finance professor at the ***University of Connecticut*** where he taught in the MBA program

- Joe is the author of ***Applied Value Investing*** (NY: McGraw-Hill, 2009), & he has published widely on financial subjects in the ***Journal of Reinsurance***, ***Journal of Investing***, ***Journal of Private Equity***, ***Strategy & Leadership***, ***Risk Management & Insurance Review***, etc.

- A list of his publications, some of which are downloadable, is available at his ***Social Science Research Network*** author's page: http://ssrn.com/author=357310

- Joe's recent research includes:
  - "Nonlinearity and Competitive (Dis)Advantage," in development
  - "Disruption and Reinsurance - An Overview & Perspective," ***Journal of Reinsurance***, Vol. 25, No. 1 (2018), pp. 23-26

Kris Kersey

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Areas of expertise

- Cryptocurrencies and Blockchain / Distributed Ledger Technologies
- Keynote speaker at numerous industry conferences on Blockchain and Crypto-Economics
- Agile, Design Thinking, New Product Development, Enterprise Architecture & Operating Model Design
- Cross-Industry experience, including Financial Services, Industrial and Consumer Products, Insurance, Health Care / Pharma, Transportation, Technology, Entertainment and Energy sectors

Meet Kris -

Kris is the Blockchain subject matter expert for our Emerging Technology and New Services group focusing across industries on how crypto-assets and currencies and blockchain-enabled ecosystem applications will impact business models and shared business processes.

Over the last 16 years, he has advised major organizations in financial services, public sector, consumer and industrial products, energy, health care, technology and media firms in areas such as digital business and technology strategies, operating model design and implementation, performance re engineering and measurement, and large-scale technology-led transformation and program management..

Kris joined PwC through the acquisition of Diamond Management & Technology Consultants in 2010 where he was a Principal in Financial Services.

Kris holds a combined masters degree from Carnegie Mellon University's Tepper School of Business and the H.J. Heinz School of Public Policy and Management.

- Kris is leading a PwC team that brought key large Pharmaceutical manufacturers and wholesalers together as founding members of a consortia formed to address industry-wide challenges with pricing and contracting that both create widespread inefficiencies and negatively impact patient/customer experience. PwC is building a pilot application and leading business case definition and analysis.
- For a large Reinsurance Company, Kris' team is providing Senior Management with strategic advice to help the clients assess a successfully deployed pilot application to determine Go-To-Market options and associated commercial implications. In addition, his team is creating a framework to map out the technical and business/governance dimensions/levers around what is required to go into production and achieve eventual scale. to help define pilot-to-production roadmap.
- For a large industrial client, Kris led a cross-disciplinary team to define the vision and design of a blockchain-enabled solution designed to transform their Order-To-Cash process. The solution connects IoT sensor data, predictive maintenance, ERP and customer systems to optimize the business process, improve receivables performance and improve the customer experience.
- For a large corporate treasurer and a large bank, Kris led the business and technology teams in the development of a blockchain pilot that transformed credit instrument processes. The results were a greater than 75% improvement in efficiency and reduction in cycle time.

Thank you!